

**Mixed exercise 5**

- E/P** 1 The straight line passing through the point $P(2, 1)$ and the point $Q(k, 11)$ has gradient $-\frac{5}{12}$.
- Find the equation of the line in terms of x and y only. (2 marks)
 - Determine the value of k . (2 marks)
- E/P** 2 The points A and B have coordinates $(k, 1)$ and $(8, 2k - 1)$ respectively, where k is a constant. Given that the gradient of AB is $\frac{1}{3}$.
- show that $k = 2$ (2 marks)
 - find an equation for the line through A and B . (3 marks)
- E** 3 The line L_1 has gradient $\frac{1}{7}$ and passes through the point $A(2, 2)$. The line L_2 has gradient -1 and passes through the point $B(4, 8)$. The lines L_1 and L_2 intersect at the point C .
- Find an equation for L_1 and an equation for L_2 . (4 marks)
 - Determine the coordinates of C . (2 marks)
- E** 4 a Find an equation of the line l which passes through the points $A(1, 0)$ and $B(5, 6)$. (2 marks)
The line m with equation $2x + 3y = 15$ meets l at the point C .
b Determine the coordinates of C . (2 marks)
- E** 5 The line L passes through the points $A(1, 3)$ and $B(-19, -19)$.
Find an equation of L in the form $ax + by + c = 0$, where a , b and c are integers. (3 marks)
- E** 6 The straight line l_1 passes through the points A and B with coordinates $(2, 2)$ and $(6, 0)$ respectively.
- Find an equation of l_1 . (3 marks)
- The straight line l_2 passes through the point C with coordinate $(-9, 0)$ and has gradient $\frac{1}{4}$.
- Find an equation of l_2 . (2 marks)
- E/P** 7 The straight line l passes through $A(1, 3\sqrt{3})$ and $B(2 + \sqrt{3}, 3 + 4\sqrt{3})$.
Show that l meets the x -axis at the point $C(-2, 0)$. (5 marks)
- E** 8 The points A and B have coordinates $(-4, 6)$ and $(2, 8)$ respectively. A line p is drawn through B perpendicular to AB to meet the y -axis at the point C .
- Find an equation of the line p . (3 marks)
 - Determine the coordinates of C . (1 mark)
- E/P** 9 The line l has equation $2x - y - 1 = 0$.
The line m passes through the point $A(0, 4)$ and is perpendicular to the line l .
- Find an equation of m . (2 marks)
 - Show that the lines l and m intersect at the point $P(2, 3)$. (2 marks)
- The line n passes through the point $B(3, 0)$ and is parallel to the line m .
- Find the coordinates of the point of intersection of the lines l and n . (3 marks)

- (E/P) 10** The line l_1 passes through the points A and B with coordinates $(0, -2)$ and $(6, 7)$ respectively. The line l_2 has equation $x + y = 8$ and cuts the y -axis at the point C . The line l_1 and l_2 intersect at D . Find the area of triangle ACD . (6 marks)
- (E) 11** The points A and B have coordinates $(2, 16)$ and $(12, -4)$ respectively. A straight line l_1 passes through A and B .
- a** Find an equation for l_1 in the form $ax + by = c$. (2 marks)
- The line l_2 passes through the point C with coordinates $(-1, 1)$ and has gradient $\frac{1}{3}$
- b** Find an equation for l_2 . (2 marks)
- (E/P) 12** The points $A(-1, -2)$, $B(7, 2)$ and $C(k, 4)$, where k is a constant, are the vertices of $\triangle ABC$. Angle ABC is a right angle.
- a** Find the gradient of AB . (1 mark)
- b** Calculate the value of k . (2 marks)
- c** Find an equation of the straight line passing through B and C . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers (2 marks)
- d** Calculate the area of $\triangle ABC$. (2 marks)
- (E/P) 13 a** Find an equation of the straight line passing through the points with coordinates $(-1, 5)$ and $(4, -2)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (3 marks)
- The line crosses the x -axis at the point A and the y -axis at the point B , and O is the origin.
- b** Find the area of $\triangle AOB$. (3 marks)
- (E) 14** The straight line l_1 has equation $4y + x = 0$. The straight line l_2 has equation $y = 2x - 3$.
- a** On the same axes, sketch the graphs of l_1 and l_2 . Show clearly the coordinates of all points at which the graphs meet the coordinate axes. (2 marks)
- The lines l_1 and l_2 intersect at the point A .
- b** Calculate, as exact fractions, the coordinates of A . (2 marks)
- c** Find an equation of the line through A which is perpendicular to l_1 . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. (2 marks)
- (E) 15** The points A and B have coordinates $(4, 6)$ and $(12, 2)$ respectively. The straight line l_1 passes through A and B .
- a** Find an equation for l_1 in the form $ax + by + c = 0$, where a , b and c are integers. (3 marks)
- The straight line l_2 passes through the origin and has gradient $-\frac{2}{3}$
- b** Write down an equation for l_2 . (1 mark)
- The lines l_1 and l_2 intersect at the point C .
- c** Find the coordinates of C . (2 marks)
- d** Show that the lines OA and OC are perpendicular, where O is the origin. (2 marks)
- e** Work out the lengths of OA and OC . Write your answers in the form $k\sqrt{13}$. (2 marks)
- f** Hence calculate the area of $\triangle OAC$. (2 marks)

- 16 a Use the distance formula to find the distance between $(4a, a)$ and $(-3a, 2a)$.
Hence find the distance between the following pairs of points:
- b $(4, 1)$ and $(-3, 2)$ c $(12, 3)$ and $(-9, 6)$ d $(-20, -5)$ and $(15, -10)$
- E/P** 17 A is the point $(-1, 5)$. Let (x, y) be any point on the line $y = 3x$.
- Write an equation in terms of x for the distance between (x, y) and $A(-1, 5)$. (3 marks)
 - Find the coordinates of the two points, B and C , on the line $y = 3x$ which are a distance of $\sqrt{74}$ from $(-1, 5)$. (3 marks)
 - Find the equation of the line l_1 that is perpendicular to $y = 3x$ and goes through the point $(-1, 5)$. (2 marks)
 - Find the coordinates of the point of intersection between l_1 and $y = 3x$. (2 marks)
 - Find the area of triangle ABC . (2 marks)

Challenge

- 1 Find the area of the triangle with vertices $A(-2, -2)$, $B(13, 8)$ and $C(-4, 14)$.

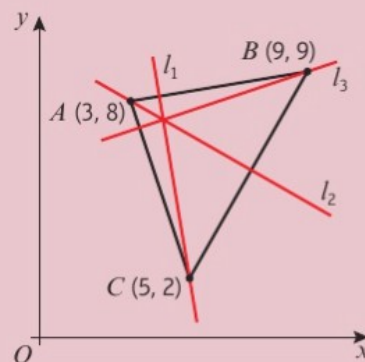
- 2 A triangle has vertices $A(3, 8)$, $B(9, 9)$ and $C(5, 2)$ as shown in the diagram.

The line l_1 is perpendicular to AB and passes through C .

The line l_2 is perpendicular to BC and passes through A .

The line l_3 is perpendicular to AC and passes through B .

Show that the lines l_1 , l_2 and l_3 meet at a point and find the coordinates of that point.



- 3 A triangle has vertices $A(0, 0)$, $B(a, b)$ and $C(c, 0)$ as shown in the diagram.

The line l_1 is perpendicular to AB and passes through C .

The line l_2 is perpendicular to BC and passes through A .

The line l_3 is perpendicular to AC and passes through B .

Find the coordinates of the point of intersection of l_1 , l_2 and l_3 .

